Amendments to the Specification

Please replace the paragraph beginning on page 2, line 24 with the following amended paragraph:

The present invention includes methods which ~~determines~~ determine network performance by determining not only the transit delay between nodes in a network but also the variance, or jitter, of such transit delays. A common node, usually a network management computer (NMC), sends out a signal to a first node of interest and measures the time before it receives an acknowledgment from the first node. The NMC then sends out a similar signal to a second node of interest and similarly measures the time required to receive an acknowledgment. Based on these two measurements, the transit delay between the first and second nodes can be calculated if the first node lies on the path between the NMC and the second node or vice versa. For a multiple node communications path, the total transit delay between any two nodes is the sum total of the transit delays between adjacent nodes lying on the path.

Please replace the paragraphs beginning on page 3, line 17 through page 7, line 3 with the following amended paragraphs:

~~In a first embodiment, the invention provides a method of determining a transit delay between a first node and a second node in a hierarchical segment of a network connected to both the first node and the second node, the method comprising:~~

~~a) sending a first signal from a common node to the first node;~~

~~b) receiving a first response signal at the common node from the first node in response to the first signal;~~

~~c) determining a first round trip time, the first round trip time being the time elapsed between steps a) and b);~~

~~d) sending a second signal from the common node to the second node;~~

~~e) receiving a second response signal at the common node from the second node in response to the second signal;~~

~~f) determining a second round trip time, the second round trip time being the time elapsed steps d) and e); and~~

~~g) calculating the transit delay between the first node and the second node according to the formula~~

~~$D(X,Y)=.\ R(NMC,X)-R(NMC,Y)/2$~~

~~where~~

~~$D(X,Y)$ is the transit delay between first node X and second node Y;~~

~~$R(NMC,X)$ is the first round trip time;~~

~~$R(NMC,Y)$ is the second round trip time; and~~

~~NMC is the common node.~~

~~In a second embodiment, the invention provides a method of determining a total transit delay between a start node and an end node in a network the method comprising:~~

~~a) determining interim transit delays between adjacent nodes in a communications path between the start node and the end node; and~~

~~b) calculating the total transit delay between the start node and the end node by adding up the interim transit delays. In the case where multiple paths may exist between the start node and the end node, separate total transit delays will be associated with each possible path.~~

~~In a third embodiment, the invention provides~~

~~a method of determining the quality of communications between two nodes in a network, the method comprising:~~

~~a) measuring a transit delay between the two nodes at different times resulting in a plurality of transit delay measurements;~~

~~b) calculating the jitter among the plurality of time delay measurements; and~~

~~c) determining if the jitter exceeds a predetermined threshold value.~~

~~In a fourth embodiment, a method of determining a jitter between two transit delay measurements between two nodes, the method comprising:~~

~~calculating the jitter based on~~

~~$J(A,D,t) = D(A,D,t_2) - D(A,D,t_1))$~~

~~where~~

~~$J(A,D,t)$ is the jitter between the two transit delay measurements;~~

~~D(A,D,t_1) is one of the two transit delay measurements taken at time t_1;~~

~~D(A,D,t_2) is the other of the two transit delay measurements taken at time t_2; and~~

~~A and D are the two nodes between which the transit delay is measured.~~

~~In a fifth embodiment the invention provides a method of determining a total jitter between a start node and an end node in a network, the method comprising:~~

~~a) determining interim jitters in transit delays between adjacent nodes in a communications path between the start node and the end node;~~

~~b) calculating the total jitter in transit delays between the start node and the end node by adding up the interim jitters.~~

~~In a sixth embodiment the invention provides a method of determining a jitter between a plurality of transit delay measurements between two nodes, the method comprising :~~

~~calculating the jitter based on~~

$$J(A,B) = \frac{\sqrt{\sum_{i=1}^{M} D(A,B,i)^2}}{\sum_{i=1}^{M} D(A,B,i)}$$

~~where~~

~~J(A,B) is the jitter between the plurality of transit delay measurements;~~

~~D(A,B,i) is the i^{th} transit delay measurement among the plurality of transit delay measurements; and~~

~~M is the number of transit delay measurements.~~

~~In a seventh embodiment the invention provides a method of determining a signal processing time in a node, the method comprising:~~

~~a) determining at least one round trip delay time of a transmission between a node A and a node K;~~

~~b) determining a round trip delay time of a transmission between a node B and a node K;~~

~~c) determining a lowest recorded value for the round trip delay time between node A and node K;~~

~~d) calculating the signal processing time through node A according to:~~

~~P(A) = R(K,B) - minimum (R(K,A))~~

~~where~~

~~P(A) is the signal processing time through node A;~~

~~R(K,B) is a round trip delay time between node B and node K; and~~

~~(minimum (R(K,A)) is the lowest recorded value for the round trip delay time between node A and node K.~~

According to a first broad aspect of the present invention, there is disclosed a method of determining a total processing overhead delay between a first node and a second node in a network connected to both the first node and the second node, the method comprising:

a) determining interim transit overhead processing delays between adjacent nodes in a communications path between the first node and the second node including the following steps:

a1) sending a first signal from a common node to the first node;

a2) receiving a first response signal at the common node from the first node in response to the first signal;

a3) determining a first round trip time, the first round trip time being a time elapsed between steps a) and b);

a4) sending a second signal from the common node to the second node;

a5) receiving a second response signal at the common node from the second node in response to the second signal;

a6) determining a second round trip time, the second round trip time being a time elapsed between steps d) and e);

a7) calculating a transit delay between the first node and the second node according to the formula

D(X,Y)= | R(NMC,X)-R(NMC,Y) |/2

where

D(X,Y) is the transit delay between first node X and second node Y;

R(NMC,X) is the first round trip time;

R(NMC,Y) is the second round trip time; and

NMC is the common node;

a8) subtracting a previously determined minimum transit delay between the first node and the second node from the transit delay between the first node and the second node; and

b) calculating a total transit overhead processing delay between the first node and the second node by adding up the interim transit processing overhead delays.

According to a second broad aspect of the present invention, there is disclosed a method of determining the quality of communications between two nodes in a network, the method comprising:

a) measuring a transit delay between the two nodes at different times resulting in a plurality of transit delay measurements;

b) calculating a jitter among the plurality of time delay measurements based on measuring a variance of the plurality of transit delay measurements; and

c) determining if the jitter exceeds a predetermined threshold value.

According to a third broad aspect of the present invention, there is disclosed a method of determining a jitter between two transit delay measurements between two nodes, the method comprising:

calculating the jitter based on

J(A,D,t) = D(A,D,t2) - D(A,D,t1))

where

J(A,D,t) is the jitter between the two transit delay measurements based on measuring a variance of the two transit delay measurements;

D(A,D,t1) is one of the two transit delay measurements taken at time t1;

D(A,D,t2) is the other of the two transit delay measurements taken at time t2; and

A and D are the two nodes between which the transit delay is measured.

According to a fourth broad aspect of the present invention, there is disclosed a method of determining a jitter between a plurality of transit delay measurements between two nodes, the method comprising :

calculating the jitter based on

$$J(A,B) = \frac{\sqrt{\sum_{i=1}^{M} D(A,B,i)^2}}{\sum_{i=1}^{M} D(A,B,i)}$$

where

J(A,B) is the jitter between the plurality of transit delay measurements;

D(A,B,i) is the i^{th} transit delay measurement among the plurality of transit delay measurements; and

M is the number of transit delay measurements.

According to a fifth broad aspect of the present invention, there is disclosed a method of determining a signal processing time in a node, the method comprising:

a) determining at least one round trip delay time of a transmission between a node A and a node K;

b) determining a round trip delay time of a transmission between a node B and a node K;

c) determining a lowest recorded value for the round trip delay time between node A and node K;

d) calculating the signal processing time through node A according to:

P(A) = R(K,B) - minimum (R(K,A))

where

P(A) is the signal processing time through node A;

R(K,B) is a round trip delay time between node B and node K; and

(minimum (R(K,A)) is the lowest recorded value for the round trip delay time between node A and node K.

Please replace the paragraph beginning on page 11, line 8 with the following amended paragraph:

Consider two adjacent nodes A1 and B1 which are connected such that the path to B1 from the NMC, K1, goes through A1 as in Figure 1. Let R(K1, B1) and R(K1, A1) be the round trip delays to nodes B1 and A1 from K1 respectively. If, at any given time, R(K1, B1) is less than the minimum ever recorded value of ~~R(k1, A1)~~ R(K1, A1) then this discrepancy is attributed to the extra processing time at node A1 and hence we deduce the processing time of A1, P(A1), as

P(A1) = R(K1,B1) - minimum(R(K1,A1))

This processing time is then subtracted from all delay calculations involving node A1. For example:

R(K1,A1) = R(K1,A1) - P(A1)

Please replace the paragraph beginning on page 15, line 13 with the following amended paragraph:

D(A,B) and D(C,A) are computed for every device A being monitored by the main software process. These calculations are stored in an internal device database as ~~will~~ well as a statistical database. The internal device database stores the most recent D(A,B) values for a device whereas the statistical database stores the history of D(A,B) values over a period of time. Average D(A,B) values for 5-minute and 1-hour intervals over the previous two days and 1-day intervals for older samples are stored in the statistical database.